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SOY BEANS IN THE COTTON BELT.

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INTRODUCTION.

The soy bean, called also soya bean, soja bean, and, in North Carolina, stock pea, is an erect, rather hairy, summer legume, resembling somewhat the common field bean, but usually much taller and not twining. In extent of uses and value it is the most important legume grown in Asiatic countries. It is utilized for human food, for forage, and, as the bean contains a valuable oil, for the production of oil and cake. Within the last few years the crop has become of special importance because of the large importations of beans, oil, and cake from Manchuria to America and Europe. The soy bean is a valuable crop in various ways, and for certain conditions has many points of superiority over the cowpea that should recommend it to the average farmer. In the growing and handling of the soy bean special labor and machinery are not necessary, the ordinary farm equipment meeting all requirements of the crop. The high yield of seed, the possibilities of the seed for the production of oil and meal, the excellent quality of its forage, the ease of growing and harvesting, and its freedom from insect enemies and plant diseases should all encourage the more extensive planting of this crop.

ADAPTATIONS.

The soy bean has wide adaptations as regards soil and climate. In general, the northern limit of its practical culture in the United States may be said to be that of corn and the southern limit that of cotton. In other words, it will succeed in the United States wherever corn or cotton is cultivated. It is especially adapted to the cotton belt, where the later and larger varieties, which give yields that make their extensive cultivation profitable, can be grown. Rabbits are exceedingly fond of the soy bean and often cause considerable damage to small areas.

NOTE.—This circular is intended especially for farmers in the cotton belt who desire to diversify their farming by partly replacing cotton as the sole money crop with other profitable crops.

The soil requirements of soy beans are similar to those of corn, but the plants will make a satisfactory growth on poorer soil than corn. The best results, perhaps, are to be obtained in medium loams, although clay and sandy soils may be made to produce good crops. The soy bean does not require a well-drained soil, although a soil where water stands for a considerable length of time is not desirable. It is able to withstand a greater amount of moisture, however, than either cowpeas or corn. The soy bean is also decidedly drought resistant—much more so than the cowpea.

SOIL PREPARATION.

Soy beans succeed best in a thoroughly prepared soil. The land should be plowed early and deep, fitted and then harrowed at intervals until the beans are planted. The young plants of soy beans are not able to push through a hard crust, as are corn and cowpeas. Thus, to insure a good stand the seed should have a light covering of loose, mellow soil. Soy beans should not be planted more than 2 inches deep, as poor stands frequently result from too deep covering.

FERTILIZERS.

The use of commercial fertilizers is recommended where sandy soil predominates or the soil is of low fertility. Where fertilizers are used good results have been obtained by using a dressing of stable manure or 300 pounds of acid phosphate and 250 pounds of wood ashes or 25 pounds of muriate of potash. Where wood ashes or the muriate are not to be had, the acid phosphate alone can be applied to good advantage. In using the commercial fertilizer it is well to apply broadcast before the beans are planted. Lime has been found almost invariably to increase the yield.

INOCULATION.

Soy beans, like other legumes, when well inoculated, add much nitrogen to the soil. Natural inoculation now occurs quite generally throughout the soy-bean region in the southern United States. In localities where the crop has not been previously grown, however, it is advisable to inoculate. Inoculation may be secured through the use of pure culture or by the use of soil from a field where the plants have previously developed nodules.

SEEDING AND CULTIVATION.

Soy beans may be sown at any time after danger of severe frosts is over, ranging from early spring until midsummer. As a rule the late varieties are preferable in the South and should be sown about the same time as corn.

Soy beans are grown either in cultivated rows or broadcast, depending on the purpose for which they are grown. The row method is preferable in weedy land and usually gives larger yields of forage and practically always of seed. The general practice for seed production is to plant in rows 30 to 48 inches apart. For hay, soiling, or green manure a drilled or broadcast crop furnishes a finer quality of forage. In rows, from 20 to 30 pounds of seed to the acre is required; when sown broadcast or drilled, from 60 to 90 pounds.

The seed is generally sown with an ordinary grain drill, either in rows or broadcast. By covering the feed cups not in use the distance between rows can be adjusted as desired. The cotton planter and corn planter have also been found satisfactory in planting large fields.

Under proper soil conditions soy beans germinate in three to five days. As soon as the seedling plants appear above the ground cultivation may begin. Soy beans should receive at least three cultivations.

ROTATIONS.

Soy beans may be combined advantageously in many systems of crop rotations. The cash value of the seed is sufficient to encourage the growing of these beans as one of the main crops of the rotation. In the South soy beans may be used in practically the same place in rotations as are cowpeas. In some localities a soy-bean crop is grown between two wheat crops and in other sections between two oat crops. Wheat, winter oats, and winter barley may follow soy beans.

MIXTURES.

Soy beans may be grown satisfactorily in combination with other crops, thus affording a greater variety and a larger yield of forage. A mixture of soy beans and cowpeas makes a very satisfactory hay. Soy beans may also be grown either for hay or for ensilage in a mixture with sorghum. Sudan grass is also excellent for growing with soy beans, both the yield and the quality of the forage being improved by the mixture. Soy beans are more generally grown with corn than with any other crop.

SOY BEANS FOR HAY.

Soy-bean hay makes a very nutritious forage and is relished by all kinds of stock. The chief value of the hay lies in its high content of digestible protein. Feeding experiments indicate that soy-bean hay is comparable to alfalfa and red-clover hay.

Soy beans may be cut at any time from the setting of seed until the leaves begin to turn yellow. The crop is best fitted for hay when the

Pods are well formed. Soy-bean hay is cured much more readily and is more easily handled than cowpea hay. The yields of hay range from 1 to 3 tons to the acre, and occasionally 4 tons to the acre are secured.

FOR PASTURE.

The soy bean may often be utilized to advantage for pasture for all kinds of stock, the most profitable method, perhaps, being to pasture with hogs, supplementing the corn ration. Soy beans and corn may be grown together or the soy beans may be sown broadcast at the last cultivation of the corn. By planting the same variety at different dates or by using varieties with different dates of maturity, the grazing may be extended over a considerable period. As a pasture crop the soy bean is not only profitable for the feed produced but also because of the increase of soil fertility due to the manure and refuse vines.

FOR SOILING.

Among soiling crops the soy bean has an important place. Having a high protein value, the crop may be fed to good advantage with less nitrogenous crops, such as corn, sorghum, Sudan grass, and millet. The great variation in the maturity of the varieties makes it possible to have a succession of forage throughout the greater part of the summer and fall. For soiling purposes the cutting may begin at the time of bloom and continue until the seed are about three-fourths grown.

FOR ENSILAGE.

When grown for ensilage, the soy bean is generally combined with corn as soy beans alone do not make a good quality of silage. Good results are secured where soy beans and corn are mixed, two or three parts of corn and one part of soy beans. This silage keeps well, is readily eaten by stock, and the animals show good gains in flesh and milk production.

FOR SOIL IMPROVEMENT.

Soy beans possess a high value for soil improvement, especially as a source of humus and nitrogen. For the best results when so used, the beans should not be allowed to get too mature.

FOR SEED.

Thus far soy beans have been a very profitable crop when grown for seed, but the industry has been developed mainly in a few sections, such as eastern North Carolina. The character of their growth, their uniform maturing habit, and their large yield of grain recommend soy beans for seed production. Soy beans generally produce much more seed to the acre than cowpeas. Under ordinary conditions the best varieties of soy beans will yield from 20 to 30 bushels

to the acre. The cost of producing the crop when the beans are planted in rows is generally about the same as for corn. In addition to the value of the seed the benefit to the land in which the beans have been grown and the thrashed vines as a source of feed must be considered.

The feeding value of soy-bean seed, which contains about 35 per cent protein, is very high and compares favorably with that of linseed and cottonseed meals. For feeding, the seed is generally ground and used with some less concentrated feed. Experiments comparing soy-bean meal and cottonseed meal indicate that soy-bean meal is superior to cottonseed meal both for milk and for butter production.

When grown for grain alone, soy beans may be cut at any time from the yellowing of the upper leaves until all of the leaves have fallen. The plants should remain in the field until the seed is thoroughly cured. In harvesting the crop for seed a self-rake reaper, a mower with side-delivery attachment, or a binder will do very satisfactory work. If only a small area is grown, soy beans may be cut with a sickle or pulled, tied in bundles, and flailed out when thoroughly dry.

Soy beans may be thrashed with an ordinary grain thrashing outfit, with a few simple adjustments. The cylinder should be run at one-half the speed used in thrashing grain, but at the same time the usual rate should be maintained for the rest of the separator. Special bean and pea separators and bean harvesters are now on the market and do very satisfactory work. Soy beans may be thrashed in the field without previous stacking, or they may be stacked or housed and thrashed later. For the best results soy beans should be thoroughly dry for thrashing; otherwise much of the seed will remain unthrashed.

STORING THE BEANS.

After the soy beans are thrashed they should be placed in shallow bins or spread out on a floor for a time. The massing of large quantities of beans, especially if they are not thoroughly dry, will cause them to heat, and this will prevent germination. Under whatever conditions stored, the seed should be examined occasionally to detect any tendency to heat. The seed of the soy beans, unlike that of the cowpea, is rarely attacked by the weevil or other grain insects. Soy beans do not retain their germinative power as well as cowpeas. Germination tests indicate that it is not advisable to sow seed two years old without previous testing.

VALUE FOR HUMAN FOOD.

Although the soy bean as an article of food has attracted attention from time to time in the United States, thus far it has been used but little. The beans contain only a trace of starch and are highly recom-

mended as a food for persons requiring a food of low starch content. The numerous ways in which the bean can be prepared as human food should encourage its greater use. The dried beans may be used like the ordinary field or navy bean in baking or in soups. When prepared in either of these ways the beans require a somewhat longer soaking and cooking. The immature bean when from three-fourths to full grown compares favorably with the butter or Lima bean. Roasted and prepared soy beans make a substitute for coffee which has been found pleasing to those fond of cereal beverages. In Asiatic countries the dried beans are soaked in salt water and then roasted, this product being eaten after the manner of roasted peanuts. Soy-bean meal or flour may be used as a constituent of biscuits, muffins, and bread; in fact, in any recipe in which corn meal is used. In the various preparations one-fourth or one-third soy bean flour or meal and the remainder wheat flour are recommended.

SOY-BEAN OIL.

Soy-bean seeds contain a valuable vegetable oil. The large annual importations of soy-bean oil and bean cake into the United States suggest a possible ready market for such products made from American-grown beans. The demand for the oil, especially in the manufacture of soap, and its possibilities for other industrial purposes, are very large, and it should be a strong competitor of other vegetable oils, for which the demand is constantly increasing both in this country and in Europe.

SOY-BEAN CAKE.

The soy-bean cake, remaining after the oil is expressed, is ground into meal and makes a highly nitrogenous feed. When the value of the meal in the production of beef and butter becomes properly recognized, there will doubtless be a large market for it as feed if prices are favorable. Owing to its high content of protein, the meal should be used with the same precautions as are observed with other highly concentrated feeds to avoid digestive troubles. As indicated above, soy-bean meal is of value as human food. It is probable that its use for this purpose will increase.

VARIETIES.

At the present time about 15 varieties of soy beans are handled commercially by growers and seedsmen, the most important of which are Mammoth Yellow (late), Hollybrook (medium late), Haberlandt (medium late), Medium Yellow (medium), Manchu (medium early), Ito San (early), Tokio (late), Biloxi (very late), Barchet (late), Virginia (medium late), Wilson-Five (medium late), Peking (medium late), and Black Eyebrow (early). All of these varieties, with the

exception of Barchet, are suitable for hay and seed production. The Barchet is especially adapted for hay and green manure in the Gulf States. For seed production alone the Mammoth, Hollybrook, Tokio, and Haberlandt are to be recommended for the South, while the Virginia, Wilson-Five, and Peking are better suited for hay.

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